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NATIONAL DAM SAFETY PROGRAM. LOCH HAVEN LAKE DAM (INVENTORY NUM--ETC(U)
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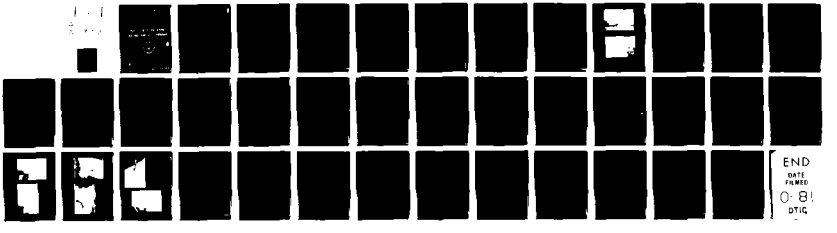

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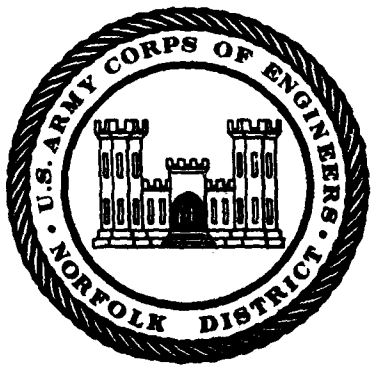
ROANOKE RIVER BASIN

LEVEL II BS

Name Of Dam: LOCH HAVEN LAKE
Location: ROANOKE COUNTY, VIRGINIA
Inventory Number: VA 16102

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



PREPARED BY
NORFOLK DISTRICT CORPS OF ENGINEERS
803 FRONT STREET
NORFOLK, VIRGINIA 23510

JANUARY 1981

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

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Approved for public release; distribution unlimited

(10) Boris O. Taran

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Dams - VA
National Dam Safety Program Phase I
Dam Safety
Dam Inspection

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

(See reverse side)

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20. Abstract

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Inspection is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the gereral conditions of the dam is based upon available data and visual inspection. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to idenify any need for such studies.

Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

Phase I reports include project information of the dam appurtenances, all existing engineering data, operational procedures, hydraulic/hydrologic data of the watershed, dam stability, visual inspection report and an assessment including required remedial measures.

NAME OF DAM: LOCH HAVEN
LOCATION: ROANOKE COUNTY, VIRGINIA
INVENTORY NUMBER: VA 16102

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY
NORFOLK DISTRICT CORPS OF ENGINEERS
803 FRONT STREET
NORFOLK, VIRGINIA 23510

JANUARY 1981

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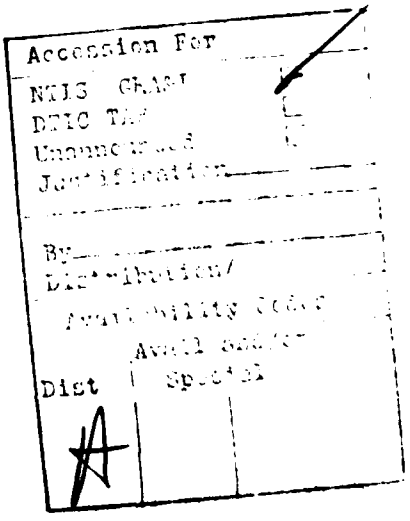


PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of the Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the design flood should not be interpreted as necessarily posing a highly inadequate condition. The design flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

BRIEF ASSESSMENT OF DAM

Name of Dam:	Loch Haven
State:	Virginia
Location:	Roanoke County
USGS Quad Sheet:	Salem
Stream:	Tributary of the Deer Branch of Cole Creek
Date of Inspection:	21 January 1981

Loch Haven Dam is a concrete structure about 79.5 feet long and 25 feet high. The dam is owned and maintained by Harriet S. Preece of Roanoke County, Virginia. The dam is classified as a small dam with a significent hazard classification. The principal spillway is a 5-inch cast iron pipe that passes through the dam. The secondary spillway is a rectangular cut near the center of the dam. An 8-inch PVC siphon pipe is available for lowering the water level in the reservoir below the principal spillway intake. The reservoir provides recreation for various community civic organizations, local businesses, members of the Loch Haven Country Club, and six families living on the property.

Based on criteria established by the Department of the Army, Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) is the 100 Year Flood. The secondary spillway will pass 4 percent of the PMF or 17 percent of the SDF without overtopping the crest of the dam. The SDF will overtop the dam by a maximum 3.66 feet, reach an average critical velocity of 9.1 feet per second and flow over the dam for 6.75 hours. The overtopping velocities are not considered detrimental to the dam. The secondary spillway is adjudged inadequate but not seriously inadequate.

No evidence of instability was observed.

It is recommended that the owner take the following action:

a. Remove spalled, loose, or otherwise unsound concrete on the downstream face of the dam and repair these areas with a suitable patching material.

b. Monitor seepage.

c. Expand and document the present maintenance program.

d. Develop an emergency operation and warning plan.

e. Clear leaves from the 5-inch cast iron pipe intake near the dam crest to maintain flow.

Submitted By:

Original signed by
JAMES A. WALSH

JAMES A. WALSH, P. E.
Chief, Design Branch

Approved:

Original signed by:
Douglas L. Haller

DOUGLAS L. HALLER
Colonel Corps of Engineers
District Engineer

Recommended By

Date: MAR 30 1981

Original signed by
JACK G. STARR

JACK G. STARR
Chief, Engineering Division

DAM & RESERVOIR

RESERVOIR AREA

OVERALL VIEWS LOCH HAVEN LAKE DAM

21 JANUARY 1981

SECTION 1

PROJECT INFORMATION

1.1 GENERAL:

1.1.1 Authority: Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers to initiate a national program of safety inspections of dams throughout the United States. The Norfolk District has been assigned the responsibility of supervising the inspection of dams in the Commonwealth of Virginia.

1.1.2 Purpose of Inspection: The purpose is to conduct a Phase I inspection according to the Recommended Guidelines for Safety Inspection of Dams (Reference 1, Appendix IV). The main responsibility is to expeditiously identify those dams which may be a potential hazard to human life or property.

1.2 Project Description:

1.2.1 Dam and Appurtenances: Loch Haven Dam is a concrete structure about 79.5 feet long and 25 feet high. The crest of the dam is 3 feet wide with a crest elevation of 1235.0 feet msl. The upstream slope is vertical and downstream slope is approximately 4 vertical to 1 horizontal. A wood and wire safety fence runs along the top of the dam.

The principal spillway is a 5-inch diameter cast iron pipe with invert elevation 1233. The pipe passes through the approximate center of the dam and extends about 4 feet downstream. Water passing through the outlet falls onto natural rock at the toe of the dam.

The secondary spillway is a rectangular cut in the middle of the dam with the crest elevation at 1234. The crest of the secondary spillway is 14 feet long and 3 feet wide.

An 8-inch PVC pipe is available to siphon water from the reservoir. The intake elevation is not known, but the pipe does pass over the secondary spillway and discharges at the toe of the dam. The siphon must be activated at the crest of the secondary spillway.

1.2.2 Location: Loch Haven Dam is located on a tributary of the Deer Branch of Cole Creek in Roanoke County, Virginia about 0.5 miles northwest of Interchange 42 on Interstate 81.

1.2.3 Size Classification: The dam is classified as a small dam as defined by Reference 1 of Appendix IV.

1.2.4 Hazard Classification: The dam is located upstream of 2 inhabited cabins and Interstate 81. Should a dam failure occur, the cabins could sustain damages with a possibility of loss of life. Therefore, a significant hazard classification is given for the Loch Haven Dam according to guidelines contained in Section 2.1.1 of Reference 1, Appendix IV. The hazard classification used to categorize dams is a function of location only and has nothing to do with their stability or probability of failure.

1.2.5 Ownership: Harriet S. Preece of Roanoke County, Virginia.

1.2.6 Purpose: The reservoir provides recreation for members of the Loch Haven Country Club, community civic organizations, local businesses, and six families living on the property.

1.2.7 Design and Construction History: The original dam is believed to have been completed in the 1930's by the Civilian Conservation Corps (CCC). An 8-inch PVC pipe was installed over the dam about 10 years ago to act as a siphon to lower the reservoir.

1.2.8 Normal Operational Procedures: The normal operation of the Loch Haven Dam is automatic with water passing over the dam as the reservoir rises above the principal and secondary spillway crests. A siphon is used to lower the water level to expose the beach and swimming facilities after a storm raises the water level in the reservoir.

1.3 Pertinent Data:

1.3.1 Drainage Area: The dam controls a drainage area of 1.31 square miles.

1.3.2 Discharge at Dam Site: The maximum flood observed by the owner, caused the reservoir level to rise about 1 foot over the crest of the dam to approximately elevation 1236.

Pool level at crest of dam

Secondary Spillway . . . . . 46 cfs

1.3.3 Dam and Reservoir Data: Pertinent data on the dam and reservoir are shown in the following table:

TABLE 1.1 DAM AND RESERVOIR DATA

Item	Elevation feet msl	Reservoir Capacity Area, acres	Acre, feet	Watershed, inches	Length feet
Crest of Dam	1235	6.8	108	1.55	900
Secondary Spillway Crest	1234	6.5	96	1.37	850
Principal Spillway Crest	1233	6.0	83	1.19	800
Streambed at Downstream Toe of Dam	1210	—	--	—	--

SECTION 2

ENGINEERING DATA

2.1 Design and Construction Records: No record of the design is available. The present owner acquired the dam in 1945. No construction records are available. There are no available drawings of any kind.

Plates 1 and 2 presented in this report were prepared from field measurements made during the 21 Jan 1981 inspection.

2.2 Evaluation: Existing engineering data is not sufficient to evaluate structural stability.

SECTION 3

VISUAL INSPECTION

3.1 Findings:

3.1.1 General: The results of the 21 Jan 1981 inspection are recorded in Appendix III. The weather was rainy and the temperature was 38°F. At the time of the inspection the pool elevation was about 1234, slightly below the secondary spillway crest. The reservoir area was covered with a sheet of ice.

3.1.2 Dam: The dam was generally in fair to good condition. No cracks or evidence of movement was observed. Aggregate in the dam was primarily 1-1/2" to 2" in diameter with some cobble size stone. A 20 square foot area of spalled concrete approximately 6" deep (maximum) was observed on the downstream dam face near the right abutment. Loose and unsound concrete was also located on the surface at other locations along the toe of the dam by striking the dam with a rock hammer. It is estimated that as much as 20 percent of the downstream surface of the dam may consist of spalled or loose concrete.

The dam was observed to be too thin to act as a gravity structure. A concrete buttress was located at the right abutment and apparently the dam was designed to span horizontally between abutments.

Seepage was observed at two locations along the right abutment contact. These locations are shown on Plate 1. The seepage flow at each location was estimated at 1 gpm. Seepage also was observed 20 ft. from the left abutment at the foundation contact. Flow was very small, little more than a drip, and no estimate of quantity was made.

3.1.3 Foundation and Abutments: Loch Haven Dam is located in the Appalachian Ridge and Valley Physiographic Province just west of the Blue Ridge Mountains in Roanoke County, Virginia. The bedrock at the site is part of a sequence of Devonian, Silurian and Ordovician sedimentary rocks comprising the Catawba Syncline. In the area of the dam, the rock units have been overturned and strike approximately N50°E and dip 70°SE. Locally, the surface exposure of the individual rock units is narrow trending as bands in a NE-SW direction. The Millboro Shale comprises much of the upper reservoir with the Keefer Sandstone (orthoquartzite) underlying the lower reservoir and dam site. Three NE-SW trending thrust faults traverse the region south of the dam site. These faults are regional features and are very old and considered inactive. No faults occur in the area of the dam site. Based on the historic seismicity, the region has been placed in seismic zone 2.

The dam abutments are both bedrock as is the channel section and immediate downstream area. Whether the dam was keyed into rock could not be determined. Both abutments are relatively steep averaging 1 horizonatal to 1-1/2 vertical. The bedrock is a very hard, medium to coarse grained, thin to medium bedded orthoquartzite. It is believed to be part of the Keefer

Sandstone of Silurian Age. The rocks strike 50° to the northeast and dip steeply to the southeast at approximately 70°. Two joint sets were measured, a dip set striking N15°W and dipping 80°NE and a strike set striking N55°E and dipping 30°SW. Extensive concodial fracturing was also observed. The rocks were generally only slightly weathered with more advanced weathering occurring along some of the bedding, joint and fracture surfaces. No faults were observed in the field during the inspection. Besides the indicated seepage at the dam contact, no other seepage, springs or wet areas were noted on the abutments.

3.1.4 Reservoir Area: The area adjacent to the reservoir is densely forested except for the beach and recreation area near the dam. The slopes are moderate to steep and appear in good condition with no evidence of significant erosion or sloughing. Upstream of the reservoir, excavated clay soil was spoiled in the lower drainage basin. Since the spoiling, in the Summer of 1979, some siltation has occurred in the reservoir. Siltation will probably continue especially during heavy runoff and may eventually cause some siltation behind the dam itself. The top of silt below the principle spillway was measured to be elevation 1217.0. The surface of the lake was frozen and only one hole was used to sound for the silt level.

3.1.5 Downstream Area: The downstream channel has a rock bottom and appears stable with no signs of erosion or scouring. The stream is relatively narrow averaging 20 feet across. The stream is shallow and the fall is gentle with a couple of deeper pools exiting just below the dam. Very little debris was noted within the channel. Approximately 100 feet downstream of the dam, the abutment slopes flatten considerably and rock outcrops are sparse. There are two small cabins downstream of the dam but only one appears to be close to the flood plain. The cabin is approximately 500 feet downstream of the dam and 15 to 20 feet above the stream elevation.

3.2 Evaluation: No evidence of instability either in the dam or foundation was observed.

Spalled, loose, or otherwise unsound concrete on the downstream face should be repaired with a suitable patching material. Spalling poses no immediate threat to the dam, however, it should be repaired to prevent potentially serious problems which could occur in the future if spalling remains unchecked.

If seeps continue after patching the spalled area at the right abutment, seepage should be monitored to detect increases in flow rate.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedures: The normal storage pool is 1233 which is the crest of the principal spillway. The reservoir provides recreation for members of the Loch Haven Country Club. Water passes automatically through the principal spillway and over the secondary spillway as the reservoir rises above the crests. A siphon can be activated to lower the reservoir approximately 5 feet, when needed.

4.2 Maintenance: Maintenance of the dam and reservoir is performed as needed by the owner.

4.3 Warning System: At present time, there is no warning system or evacuation plan for Loch Haven Dam.

4.4 Evaluation: The dam does not require an elaborate operational and maintenance procedure. However, the present maintenance program should be expanded and documented. An emergency operation and warning plan should be developed. It is recommended that a formal emergency procedure be prepared and furnished to all operating personnel. This should include:

a. How to operate the dam during an emergency.

b. Who to notify, including public officials, in case evacuation from the downstream area is necessary.

The owner has indicated by correspondence that a formal emergency procedures plan will be developed. Also at the present time, all operating personnel are aware of all procedures.

SECTION 5

HYDRAULIC/HYDROLOGIC DATA

5.1 Design: None were available.

5.2 Hydrologic Records: None were available.

5.3 Flood Experience: The maximum observed flood caused the reservoir to rise about 1 foot higher than the dam crest to about elevation 1236.

5.4 Flood Potential: The 1/2 PMF and PMF, and 100-year flood were developed and routed through the reservoir by use of the HEC-1DB computer program (Reference 2, Appendix IV) and appropriate unit hydrograph, precipitation and storage-outflow data. Clark's Tc and R coefficient for the local drainage area were estimated from basin characteristics. The rainfall applied to the developed unit hydrograph was obtained from the U. S. Weather Bureau Publication (Reference 3, Appendix IV).

5.5 Reservoir Regulation: Pertinent dam and reservoir data are shown in Table 1.1.

Water passes automatically through the principal spillway and over the secondary spillway as the reservoir rises.

The storage curve was developed based on areas obtained from a U. S. Geological Survey Quadrangle Map. Survey data taken during the inspection was correlated to the Salem, Virginia Quadrangle Map to help develop the area-storage data. Rating curves for the non-overflow section and the secondary spillway were developed by hand calculations. In routing hydrographs through the reservoir, it was assumed that the initial pool level was at the principal spillway crest (elevation 1233). Flow through the principal spillway was neglected.

5.6 Overtopping Potential: The probable rise in the reservoir and other information on reservoir performance is shown in the following table:

Table 5.1 RESERVOIR PERFORMANCE

Item	Normal Flow	100 1/ Year	1/2 PMF	PMF 2/
Peak flow c.f.s.				
Inflow	1	2013	5255	10510
Outflow	1	1958	4967	10258
Maximum elevation				
ft. msl	1233	1238.66	1242.78	1247.24
Non-overflow section				
(el 1235 ft msl)				
Depth of flow, ft	-	3.66	7.78	12.24
Duration, hrs	-	6.75	18.25	19.5
Velocity, fps 3/	-	9.1	13.2	16.6
Tailwater elevation				
ft msl	1210±	1217	1223	1232

1/ The 100 Year Flood has one chance in 100 of occurring in any given year.
2/ The PMF is an estimate of flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region.
3/ Critical Velocity

5.7 Reservoir Emptying Potential: An 8-inch diameter PVC pipe can be used to siphon water from the reservoir. The reservoir can be lowered approximately 5 feet maximum each year to perform maintenance around the reservoir.

5.8 Evaluation: Based on the size (small) and hazard classification (significant) the recommended Spillway Design Flood is the 100 Year Flood to the 1/2 PMF. Because of the risk involved, the 100 Year Flood has been selected as the SDF. The secondary spillway will pass 4 percent of the PMF or 17 percent of the SDF without overtopping the crest of the dam. The SDF will overtop the dam by a maximum 3.66 feet, reach an average critical velocity of 9.1 feet per second and flow over the dam for 6.75 hours.

Conclusions pertain to present day conditions. The effect of future development on the hydrology has not been considered.

SECTION 6

DAM STABILITY

6.1 Stability Analysis: No stability analysis is available. Available engineering data is not sufficient to perform a proper stability analysis.

A one foot strip at several elevations on the dam was analyzed as an unreinforced beam spanning horizontally between abutments, simply as a rough measure of the state of stress in the dam. These calculations, based on field measurements and headwater at the dam crest, indicate that the cracking moment strength of the unreinforced concrete will provide a safety factor of approximately 1.7 against a beam type failure. This analysis assumes that the dam is properly keyed into rock at the abutments and neglects internal hydrostatic pressure in the dam.

6.2 Foundation and Abutments: There are no exploratory data, design or construction documents that indicate the subsurface foundation conditions and/or treatment. The geologic description of the foundation and abutments is based on the field inspection and the Division of Mineral Resource Publication "Geology of the Salem Quadrangle, Virginia."

Because the foundation of the dam is very hard, only slightly weathered orthoquartzite, settlement of the dam is not a problem. Foundation sliding is also not considered a problem because most of the dam is wedged into the abutments which are, therefore, acting as buttresses. In addition, there are no adversely oriented weak planes within the foundation bedrock that would act as potential sliding planes. The orientation of the bedding and jointing are also not conductive to abutment sliding.

Because of the joint orientation and spacing some toppling has occured just downstream of the dam. The direction of toppling, however, is downstream and does not affect the dam itself. Progressive toppling to the point of reaching the dam is very unlikely.

It is not known whether a cutoff trench or key was installed during construction; however, only minor seepage would be expected because of the bedrock foundation and the small hydraulic head. Any seepage would probably occur along the dip joint set that strikes roughly perpendicular to the dam alignment and dips close to vertical. The dip joints mapped during the inspection were very tight and discontinuous with only a 1 to 2 foot spacing.

6.3 Evaluation: No evidence of dam or foundation instability was observed during the field inspection.

Caution should be exercized when assessing the results of calculations indicated in section 6.1 above. Due to the many assumptions made during this analysis and particularly since the existing strength of the concrete is unknown, these calculations do not prove the dam is stable. The value of the calculations, which are approximate in nature, is that they do not indicate unsafe conditions in the dam itself.

Since no unsafe conditions were noted in the structure or abutments; the dam has withstood loadings close to the projected spillway design flood; and the dam is small with only a significant hazard; no comprehensive stability analysis is required.

SECTION 7

ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment: Corps of Engineers guidelines indicate the appropriate Spillway Design Flood (SDF) for a small size and significant hazard dam is the 100 year flood. The secondary spillway will pass 17 percent of the SDF without overtopping the dam. The SDF will overtop the non overflow section by 3.66 feet. The spillway is adjudged as inadequate, but not seriously inadequate.

Loch Haven Dam is in generally fair to good condition. Seepage is minor. Some surface deterioration of concrete on the downstream face of the dam was observed, otherwise the dam is in good condition. No signs of instability were observed.

7.2 Recommended Remedial Measures: The owner should implement the following recommendations:

7.2.1 It is recommended that loose, deteriorated, or spalled concrete be removed from the downstream face of the dam. Concrete should be patched with a suitable epoxy or cementitious material recommended by the manufacturer's representative for the intended use. This work should be accomplished when the reservoir has been lowered so that seepage is minimized.

7.2.2 If repair to the spalled concrete at the right abutment does not stop seepage, seeps should be monitored. The purpose of monitoring seepage is to detect any future change of foundation or dam condition.

7.2.3 Expand and document the present maintenance program to include regular inspections of the dam.

7.2.4 Develop an emergency operation and warning plan. A formal emergency procedure should be prepared and furnished to all operating personnel. This should include:

a. How to operate the dam during an emergency.

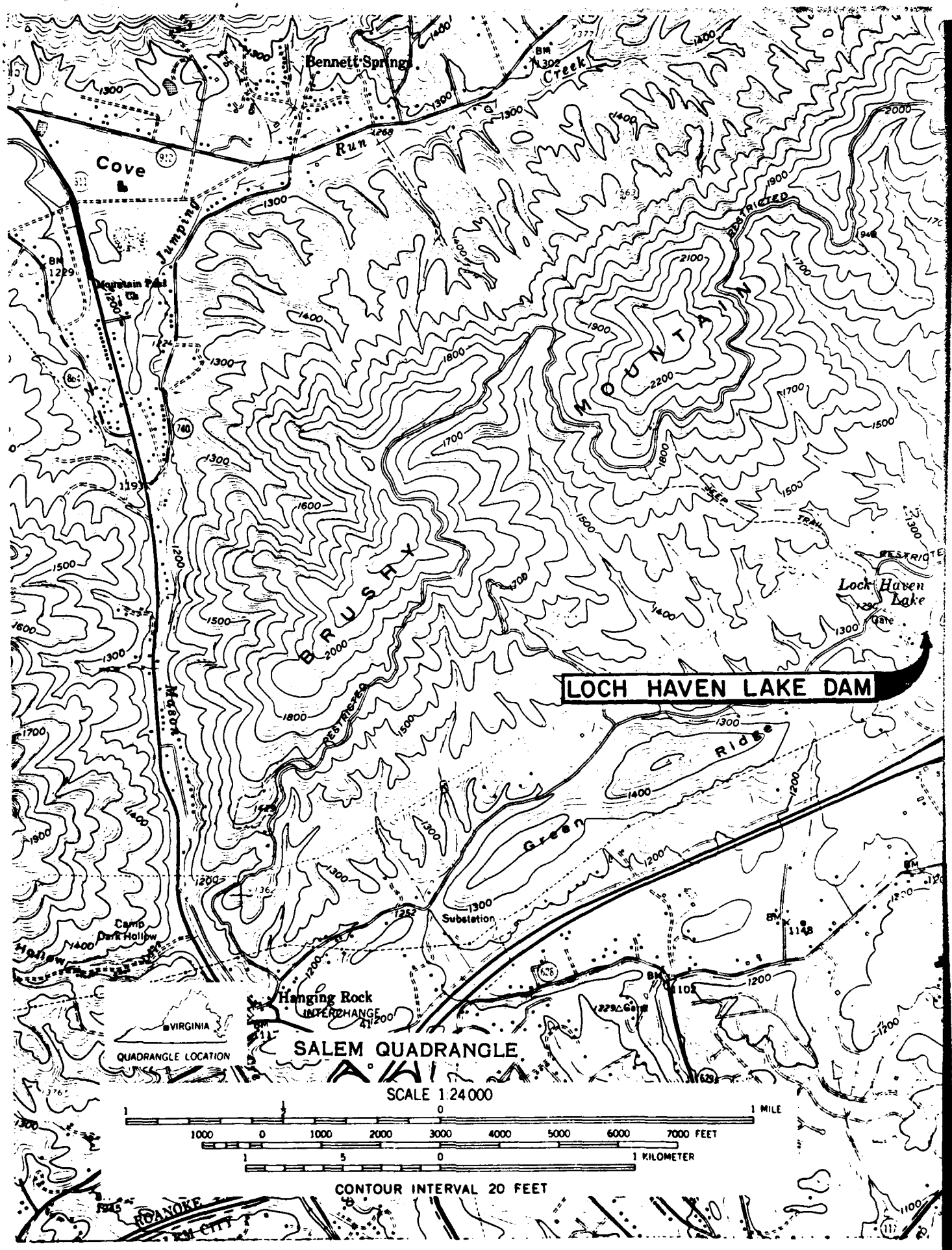
b. Who to notify, including public officials, in case evacuation from the downstream area is necessary.

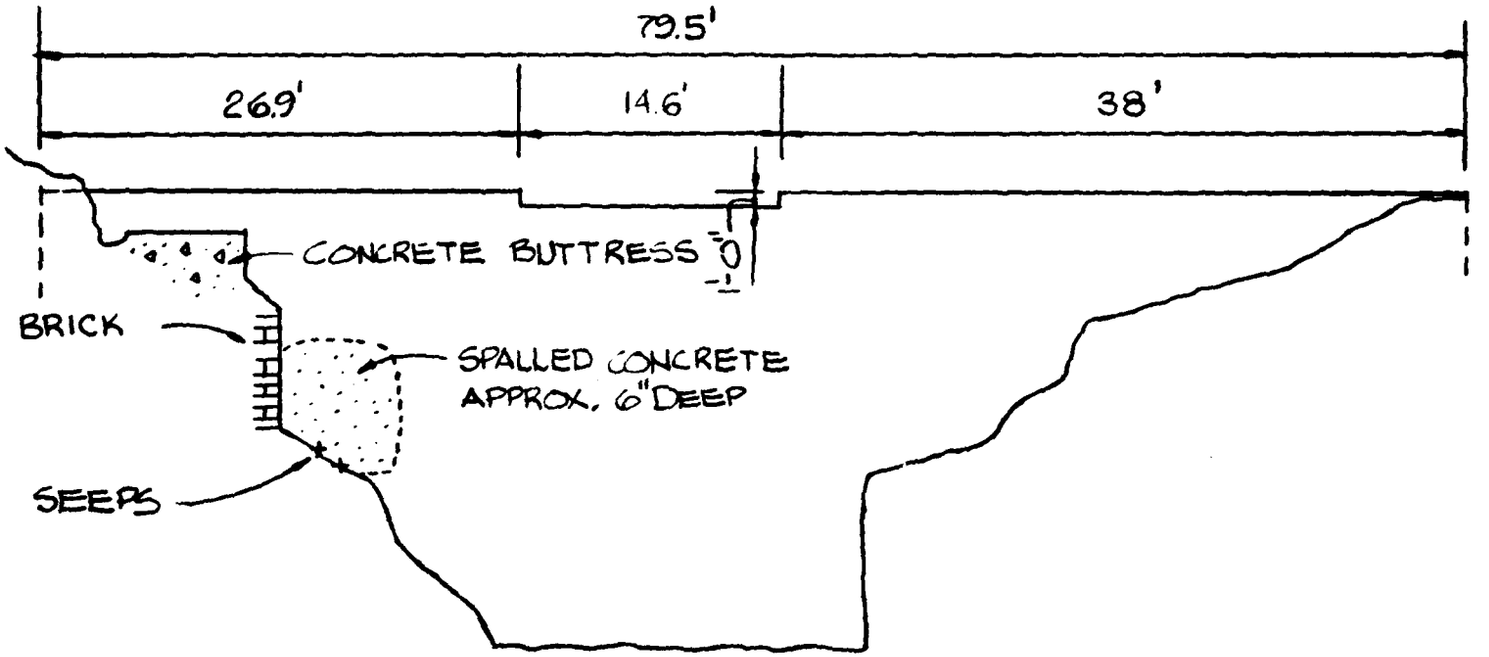
7.2.5 Clear leaves from the 5-inch cast iron pipe intake near the dam crest to maintain flow. A trash screen may prevent future blockage.

7.3 Actions: The owner has indicated by correspondence that a formal emergency procedures plan will be developed. Also, the owner has indicated that seeps are monitored and that repairs will be instituted to the downstream face of the dam.

APPENDIX I

MAPS AND DRAWINGS

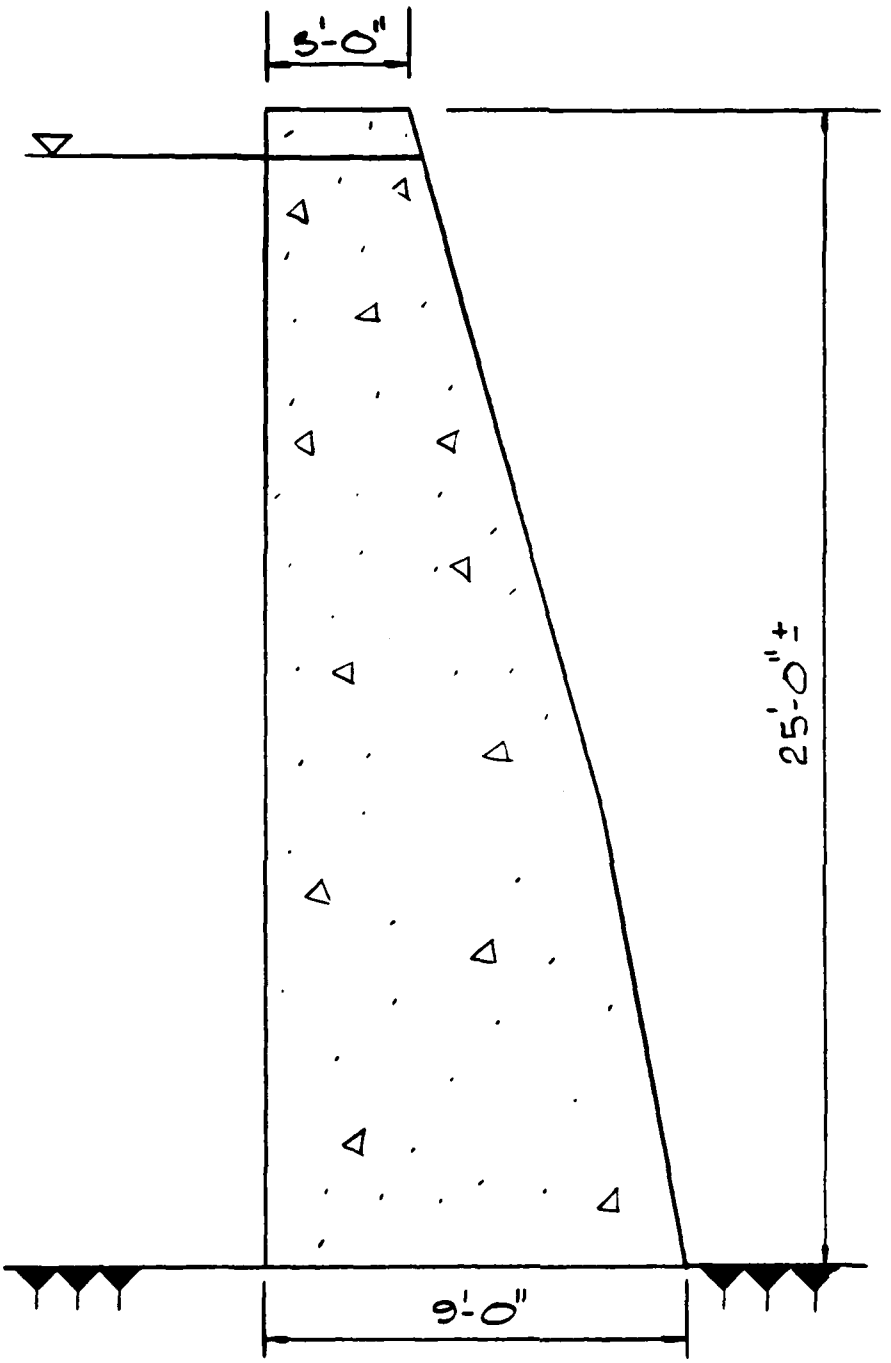

LOCH HAVEN LAKE DAM
Bennett Springs
Cove
Run
Creek
Jumping
Mountain Path
BRUSHY MOUNTAIN
RESTRICTED
JEEP TRAIL
Lock Haven Lake
Gate
Ridge
Green
Substation
Camp Dark Hollow
Hanging Rock
INTERCHANGE
VIRGINIA
QUADRANGLE LOCATION
SALEM QUADRANGLE
SCALE 1:24000
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER
CONTOUR INTERVAL 20 FEET
ROANOKE



DOWNSTREAM ELEVATION
LOCH HAVEN LAKE DAM
SCALE 1" = 10'

21 JAN. 1981

PLATE 1



SECTION AT ℄ OF DAM

LOCH HAVEN

SCALE 1/4" = 1'-0"

21 JAN. 1981

PLATE 2

APPENDIX II

PHOTOGRAPHS

PHOTO #1 CREST OF DAM

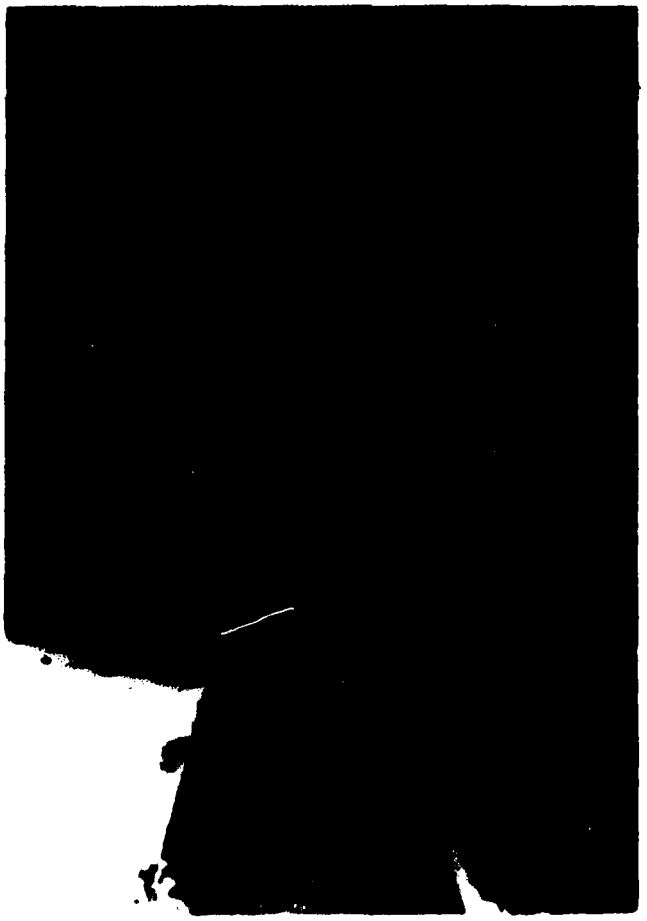


PHOTO #2
CREST OF DAM

PHOTO #3 FACE OF DAM

PHOTO #4
CONTACT
RT. ABUTMENT

PHOTO #5
TYPICAL DETERIORATION
OF CONCRETE

PHOTO #6 WATER OVERFLOW IMPACT
AREA

APPENDIX III

FIELD OBSERVATIONS

Check list
Visual Inspection
Phase I

Name Dam: Loch Haven City: Roanoke County State: Virginia Coordinates: Lat. 3720.7
Long. 8000.1

Date(s) Inspection: 21 Jan 1981 Weather: Light Rain Temperature: 38° F

Pool Elevation at Time of Inspection: 1234± Tailwater at Time of Inspection: 1210±

Inspection Personnel:

M. Stith, COE
J. Robinson, COE
B. Taran, COE
L. Jones, COE
D. Davis, COE
B. Barker, COE
H. Gildea, SWCB
Harriet S. Preece, Owner

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SEEPAGE/LEAKAGE	Seepage was located as follows: Left Abutment: 20 ft. from left abutment at the dam/abutment contact. Flow was very small, little more than a drip, and no estimate of quantity was made. Right Abutment: 2 locations approximately 17 ft. from the right abutment at the dam/abutment contact. Each seep was estimated at 1 GPM.	Spalled concrete at these locations should be patched.
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	Structure to abutment junctions appeared tight with no sign of movement noted.	
DRAINS	N/A	
WATER PASSAGES	N/A	
FOUNDATION	Foundation is hard competent ortho-quartzite. No seepage was observed anywhere through the foundation rock. The rock abutments appeared stable and no failed material was observed along the channel section.	

C ONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	A slow seep thru the dam 20' from the left abutment was observed. Seepage was less than 1 GPM, spalling here was approximately 1" deep. Tapping with a hammer revealed that much of the toe of the dam consists of spalled or loose unsound concrete on the surface. Perhaps as much as 20% of the downstream face of the dam is spalled or loose. A 20 square foot area approximately 15 ft. from the right abutment is spalled as much as 6" deep at the dam/foundation contact.	Spalled concrete should be repaired.
STRUCTURAL CRACKING	None observed. Aggregate was primarily small with average diameter approximately 1-1/2". In the spalled area, near the right abutment, some 6" cobbles were noted. No reinforcing bars were observed. The dam is too thin to act as a gravity structure. It apparently spans horizontally between abutments.	
VERTICAL AND HORIZONTAL ALIGNMENT	No evidence of misalignment or movement was observed.	
MONOLITH JOINTS (VERTICAL)	None observed.	
CONSTRUCTION JOINTS	None observed.	

PRINCIPAL SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONTROL SECTIONS	A 5-inch cast iron pipe with invert at elevation 1233 controls normal pool. Leaves and ice partially block the outlet.	Clear leaves and ice from intake.
APPROACH CHANNEL	No trash rack was observed over the pipes intake.	Trash should be removed from the intake. A trash screen may be useful in preventing blockage of the pipe.
DISCHARGE CHANNEL	The outflow from the principal spillway drops to natural rock below the toe of the dam.	None

SECONDARY SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONTROL SECTIONS	A concrete rectangular cut 14-feet wide with crest elevation at 1234 acts as the control section of the secondary spillway.	None
APPROACH CHANNEL	The Reservoir is immediately upstream of the spillway.	None
DISCHARGE CHANNEL	A vertical drop from the crest allows the discharge to fall onto natural rock.	None
BRIDGE AND PIERS	A wire fence with wood and steel supports is located on the downstream edge of the dams crest.	None
MISCELLANEOUS	An 8-inch PVC pipe, used as a siphon, is located in the spillway crest.	None

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATION
	No instrumentation was observed.	

RESERVOIR

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	The area adjacent to the reservoir is densely forested except for the beach and recreation area near the dam. The slopes are moderate to steep and appear in good condition with no evidence of significant erosion or sloughing.	None.
SEDIMENTATION	Upstream of the reservoir, excavated clay soil was spoiled in the lower drainage basin. Since the spoiling, in the Summer of 1979, some siltation has occurred in the reservoir. Siltation will probably continue especially during heavy runoff and may eventually cause some siltation behind the dam itself.	Monitor the sediment build up at the dam.

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream channel has a rock bottom and appears stable with no signs of erosion or scouring. The stream is relatively narrow averaging 20 feet across. The stream is shallow and the fall is gentle with a couple of deeper pools exiting just below the dam. Very little debris was noted within the channel.	None
SLOPES	Approximately 100 feet downstream of the dam the abutment slopes flatten considerably and rock outcrops are sparse.	None
APPROXIMATE NO. OF HOMES AND POPULATION	There are two small cabins downstream of the dam but only one appears to be close to the floodplain. That cabin is approximately 500 feet downstream of the dam and 15 to 20 feet above the stream elevation.	None

APPENDIX IV

REFERENCES

1. Recommended Guidelines for Safety Inspection of Dams, Office of the Chief of Engineers, Department of the Army, Washington, D. C.

2. HEC-1DB Flood Hydrograph Package, (Hydrologic Engineering Center, U. S. Army Corps of Engineers, September 1978.)

3. "Probable Maximum Precipitation Estimates, United States East of the 105th Meridian," Hydrometeorological Report No. 51, (U. S. Weather Bureau, June 1978).

4. "Rainfall Frequency Atlas of the Unites States", Technical Paper No. 40, (U.S. Weather Bureau, May 1961).

5. "Geology of the Salem Quadrangle, Virginia", by R. V. Amato, Virginia Division of Mineral Resources, Report of Investigation No. 37, 1979.